Vectors

Aaah, good old dependable vectors. They've got a certain magnitude about them, and they always have a clear direction. Much like an inspirational leader. It's kind of how I see myself after I've brought about the revolution.

1 Point A has position vector $4\mathbf{i} + 2\mathbf{j}$ and point B has position vector $6\mathbf{i} - 3\mathbf{j}$.

a) Find the vector $\overrightarrow{AB}$.

.....

(2 marks)

b) Find the exact magnitude of vector $\overrightarrow{AB}$.

.....

(2 marks)

2 Points A, B and C have position vectors $-\mathbf{i} + 7\mathbf{j}$, $5\mathbf{i} - 3\mathbf{j}$ and $8\mathbf{i} + 4\mathbf{j}$ respectively. M is the midpoint of AB.

a) Show that $|\overrightarrow{AM}| = \sqrt{34}$.

(3 marks)

b) Find the position vector of the point D, such that $\overrightarrow{AC} = \overrightarrow{BD}$.

.....

(3 marks)

3 Points A and B have position vectors $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$ and $\begin{pmatrix} -3 \\ 5 \end{pmatrix}$ respectively.
Point C is the point on the line AB such that $AC : CB = 1 : 3$. Find the position vector of C.

Don't be confused by the different types of vector notation.

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(4 marks)

Vectors

4 Find the magnitude and direction of the resultant vector $\mathbf{a} + \mathbf{b} + \mathbf{c}$, where $\mathbf{a} = (4\mathbf{i} + 6\mathbf{j})$, $\mathbf{b} = (\mathbf{i} - 2\mathbf{j})$ and $\mathbf{c} = -3\mathbf{j}$.

.....

(5 marks)

5 A vector of magnitude 7 acts vertically upwards. Another vector, of magnitude $4\sqrt{2}$, acts at an angle of 45° below the positive horizontal direction. The resultant of the two vectors is **r**.

a) Find **r** in terms of **i** and **j**.

r = ...

(2 marks)

b) The vector **s** acts parallel to **r**, and has magnitude 35. Find **s** in terms of **i** and **j**.

s = ...

(3 marks)

6 The point P is 14 m from point O. The point Q is 11 m from O. The angle between the position vectors $\overrightarrow{OP}$ and $\overrightarrow{OQ}$ is 105°.

Be prepared to use some trig rules here.

a) Find the distance between the points P and Q.

..... m

(2 marks)

b) Find the size of angle OPQ.

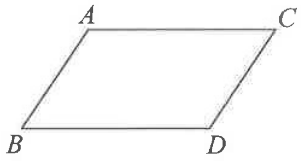
°

.....

(2 marks)

Vectors

7 Four cones are placed in a field, forming a parallelogram $ABDC$ as shown below. The position vectors of three of the cones relative to a fixed origin are $A = (5\mathbf{i} + 2\mathbf{j})$ m, $B = (\mathbf{i} - 4\mathbf{j})$ m and $C = (19\mathbf{i} + 2\mathbf{j})$ m. Find the exact perimeter of the parallelogram in m.



..... m

(6 marks)

8 Figure 1 shows a sketch of a triangle, PQR. Given that $\overrightarrow{PQ} = \begin{pmatrix} 2 \\ -9 \end{pmatrix}$ and $\overrightarrow{QR} = \begin{pmatrix} 14 \\ 6 \end{pmatrix}$, find the angle at P.

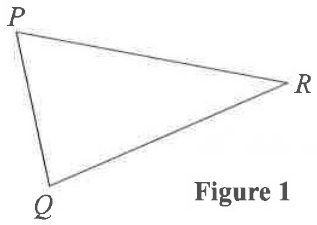


Figure 1

..... °

(5 marks)

EXAM TIP

Once you've grasped the magnitude of this topic, and got these questions cracked, you'll be heading in the right direction for exam success. Make sure you're comfortable with finding the length of vectors using Pythagoras, and using trig to find angles. There's not too much more to it to be honest. Don't forget to underline your **i** and **j** vectors, or use column notation.

Score